Investigating the catalytic properties of calcium compounds

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ABSTRACT

Marine based shell wastes are considered as under-exploited natural resources in Malaysia. Thus, the present study was concerned with the utilisation of cockle shells to be transformed into calcium oxide (CaO) for the treatment of methylene blue (MB). The synthesised CaO was produced from the calcination of cockle shell at temperature of 900°C. The characterization of CaO for pre and post reaction powder were performed by using XRD, TGA, BET, FTIR, SEM and EDX. The effect of several operational parameters such as oxidant and stirring speed on the solution have been studied. The experimental results revealed that the reaction of 2.5g/L of CaO under oxygen rich condition with stirring speed of 500 rpm gave the highest MB removal rate with 64% within 2 hour of reaction time. Furthermore, from the analysis on the post reaction powder, it was found that the reaction with CaO was not adsorption but was possibly due to the advanced oxidation process (AOP) that was highly accelerated in the alkaline condition. In short, the utilisation of CaO derived from cockle shell showed a good degradation of MB. This has opened up a newer and greener route for recovering and recycling of waste shells into valuable calcium compounds that can be used extensively in environmental remediation.

KEYWORDS

Calcium oxide; Cockle shell; Methylene blue; Calcination; Advanced oxidation process

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